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(54) CONTAINERS

(71) We, METAL BOX LIMITED, of Queens House, Forbury Road, Reading RG1 3JH, Berkshire, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to containers having a diaphragm across the mouth and removable lid to cover the diaphragm and methods of manufacturing such containers.

In one aspect the invention provides a method of making a tubular container body having one end open and the other end closed by a diaphragm which is covered by a removable and replaceable lid, said method comprising the steps of placing a diaphragm, having a closure panel surrounded by a channel portion, into a lid adapted to support the channel portion of the diaphragm; introducing an adhesive in fluid form into the channel; and fitting an end portion of a container body into the channel of the diaphragm, to displace at least some of the adhesive to seal any irregularities in the end portion of the body and bond the body to the diaphragm.

In another aspect the invention provides a container made by the method.

Various embodiments of the invention will now be described, by way of example, and with reference to the accompanying drawings, in which:—

Fig. 1 is a side elevation of a round diaphragm sectioned on a diameter,

Fig. 2 is a side elevation of a round slip lid sectioned on a diameter,

Fig. 3 is a side elevation of the diaphragm of Fig. 1 in the lid of Fig. 2, during placement of adhesive,

Fig. 4 is a sectioned side elevation of a container body fitted to the assembled lid and diaphragm of Fig. 3,

Fig. 5 is a diagrammatic sketch of the container of Fig. 4 to show the engagement between the container body, the diaphragm and the adhesive;

Fig. 6 is a sectioned elevation to show part of a lid and diaphragm fitted on a composite body,

Figs. 7 and 8 are similar views to Fig. 6 showing alternative embodiments suitable for sheet and metal bodies.

Referring generally to Figures 1 to 4 it will be seen that according to a first method, a container body having one end open, and the other end closed by a diaphragm covered by a removable lid, is made by the steps of placing a shaped diaphragm 1 having a channel portion 3 (as shown in Fig. 1) into a slip lid 6 (as shown in Fig. 2), introducing a fluid adhesive 11 into the channel 3 (as shown in Fig. 3), fitting one end of a container body 13 into the diaphragm so that at least some of the adhesive is displaced to seal any irregularities in the body and, on setting, bond the body to the diaphragm (as shown in Fig. 4). Thereafter the container may be filled with products, which may be moisture sensitive powders (such as coffee or milk powders) or liquids, and then closed by known means such as a can end 21, adapted for double seaming. The containers are opened by removing the slip lid and cutting out the centre of the diaphragm to leave the channel portion on the container.

Fig. 1 shows a diaphragm 1 vacuum formed from a portion of sheet plastics material to comprise a closure panel 2 surrounded by a channel portion 3 and a skirt portion 4 upstanding from the outer channel wall, terminating in an outwardly-directed flange 5. The flange may optionally be omitted by trimming the peripheral margin of the skirt portion 4 to sever the diaphragm from the sheet material after forming.

The slip lid 6 of Fig. 2 is formed from a portion of sheet metal to comprise a planar portion 7, joined by a peripheral annular portion 8 to an upstanding cylindrical skirt portion 9 which terminates in an outward curl 10.

In Fig. 3 the diaphragm 1 has been

placed in the slip lid 6, the outside diameter of the skirt portion 4 of the diaphragm 1 and the inside diameter of the skirt 9 of the lid 6 being chosen to permit sliding of the diaphragm 1 into the lid 6.

The assembled lid and diaphragm are rotated while adhesive 11 is directed into the channel portion 3 of the diaphragm 1, from a nozzle 12. This operation may be conveniently done by means of known lining machines such as are commonly used for placing the sealing gaskets in can ends. A suitable adhesive is that sold as "Seam Dope" (Trade Mark) by W. R. Grace & Co. Ltd., because this fluid flows readily and dries in air to form a sealing bond.

A tubular can body is formed in a known body making machine by folding a rectangular sheet metal blank and interlocking the adjacent edges to a locked side seam. Preferably the seam is sealed by solder or side seam cements. The tubular body is flanged at one end, curled at the other and, if desired a circumferential bead may be formed in the cylindrical wall. In Fig. 4 such a can body 13 having a cylindrical wall 14, a flange 15, a curl 16 and a bead 17 has been fitted into the diaphragm as described with reference to Fig. 3 so that the curl 16 of the body is pushed into the channel portion 3 of the diaphragm 1 so displacing at least some of the fluid adhesive 11. In Fig. 4 the side seam 18 is of known kind having an interlocked portion 19 consisting of four layers and an overlapping portion 20 consisting of two layers only.

This arrangement facilitates the flanging, curling and double seaming of ordinary can ends such as that denoted 21. However, the seal of overlapping portions can be spoiled during flanging or curling and it will be understood that the adhesive 11 in the diaphragm 1 serves to repair any such damage, when the curl is placed therein.

In Fig. 5 part of the skirt 9 of the lid 6 and skirt portion 4 of the diaphragm 1 have been removed to show one form of the engagement of the body 13 with the diaphragm 1 and the location of the adhesive around the side seam 18. As the body 13 is pushed into the diaphragm 1 the body curl 16 displaces some of the adhesive 11 from the channel 3, of the diaphragm, upwards into the overlapping portion 20 of the side seam 18 to fill not only the void arising at the edge of the outer overlapping layer of metal but also any other voids within reach such as the crevice between the curl 16 and the cylindrical wall 14 of the body 13.

The curl 16 in Figs. 4 and 5 is an inwardly projecting outwardly-directed curl and in making such a curl the overlapping portion 20 of the side seam 18 is subjected to considerable deformation which may

open the lap seal; therefore curls such as 16 are most likely to benefit from this invention. However an outward curl, such as that denoted 26 in Fig. 8, has overlapping seam material 20 in the inside of the can which is not severely worked after side seaming so that the adhesive 11 bonds this material 20 to the diaphragm 23.

In Fig. 8 an alternative lid 22 is shown of the snap fit type. In this embodiment of the invention the channel portion 23 of the diaphragm is shaped to follow the curve of the outward curl 26 of the can body and the skirt portion 27 of the lid 22 is a snap fit with the channel portion 23 of the diaphragm. In this embodiment of the lid, the skirt portion 27 surrounds a planar panel 25 which is countersunk to engage with the closure panel 24 of the diaphragm.

Fig. 7 shows a further embodiment in which the end of the container body 33 terminates in an inward curl 36. The form of engagement between the slip lid 30, the skirt 34 and channel portion 32 of the diaphragm 31, and the body curl 36 is similar to that described with reference to Figs. 4 and 5.

In a manner as already described, the adhesive 38 serves to bond the channel portion 32, of the diaphragm 31, to the curl 36 and seal the step arising at the overlapping seam portions (not shown).

In Fig. 6 the container body 43 is made of a spirally wound composite lamination of paper materials, which may optionally include a metal foil. When bodies made from such materials are used to contain liquids there is a tendency for the cut ends, such as that denoted 46, to act like a wick and draw the liquid into the lamination. From Fig. 8, it will be seen that the skirt portion 44 and channel portion 42 of the diaphragm serve to confine the adhesive 41 in such a way that, when the cut end portion 46 of the body, and a region adjacent, are inserted in the channel portion 42, the adhesive is moved to seal the cut end portion 46 and subsequently bond the diaphragm to the body 43. In all the embodiments described the diaphragm provides the primary seal for the container when in use. The containers are opened by removing the slip lid and cutting around the central panel of the diaphragm. This leaves the channel portion of the diaphragm intact upon the container ready to receive the slip lid as a reclosure.

Containers according to the invention may be round or other cross-sectional shapes such as square or oblong. Whilst the embodiments described include bodies made of sheet metals, such as tinplate and aluminium, and composite materials such as spirally wound papers and cardboard, the invention is not limited thereto, con-

ainers made of plastics materials also being within the scope of the invention.

The preferred material for the diaphragm is polystyrene sheet of the order of .006" thick, which may be clear or pigmented; however, other materials such as polyvinyl chloride and acrylonitrile-butadiene-styrene may be used. Alternatively the diaphragm may be drawn from aluminium foil to have either a smooth side wall or a wrinkled side wall. In both cases the adhesive placed in the annular channel is able to create an adequately sealed joint between the container body and the diaphragm.

WHAT WE CLAIM IS:—

1. A method of making a tubular container body having one end open and the other end closed by a diaphragm which is covered by a removable and replaceable lid, said method comprising the steps of placing a diaphragm, having a closure panel surrounded by a channel portion, into a lid adapted to support the channel portion of the diaphragm; introducing an adhesive in fluid form into the channel of the dia-

phragm; and fitting an end portion of the container body into the channel of the diaphragm to displace at least some of the adhesive to seal any irregularities in the end portion of the body and bond the body to the diaphragm.

2. A method according to Claim 1 wherein the diaphragm is provided with a peripheral skirt portion, adapted to confine and direct the adhesive into the side seam of the container body.

3. A container body made according to the method of Claim 1 or Claim 2.

4. A method of making a container body substantially as hereinbefore described, with reference to Figs. 1 to 5 of the accompanying drawings.

5. A method of making a container body substantially as hereinbefore described with reference to Fig. 6 or 7.

6. A method of making a container body, substantially as hereinbefore described with reference to Fig. 8.

J. WENDON,
Chartered Patent Agent.

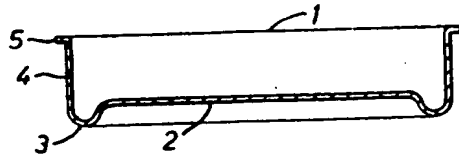


FIG. 1

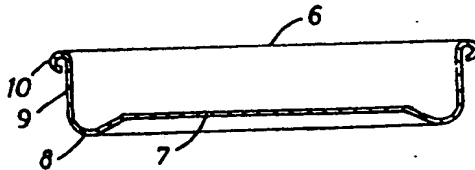


FIG. 2

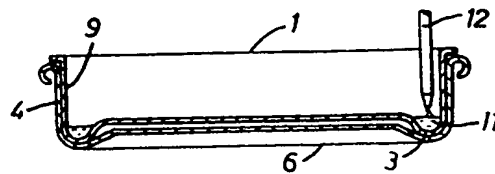


FIG. 3

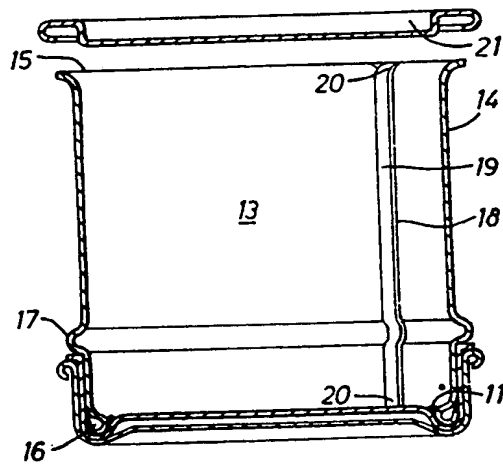


FIG. 4

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COMPLETE SPECIFICATION

2 SHEETS

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the Original on a reduced scale
Sheet 2

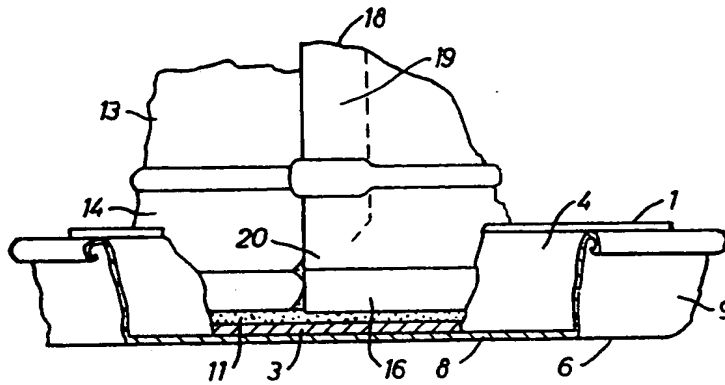


FIG. 5

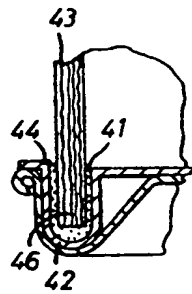


FIG. 6

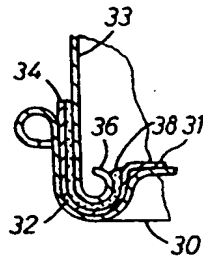


FIG. 7

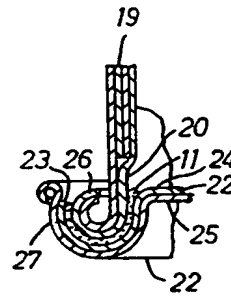


FIG. 8

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